WHAT IS CLAIMED IS:

1. A nanostructure fabrication method, comprising:

forming on a substrate a film including a vector polymer comprising a payload moiety;

patterning the film; and

removing organic components of the patterned film to form a payload-comprising nanoparticle.

2. The method of claim 1, wherein the vector polymer comprises a number of repeat units each comprising the payload moiety.

3. The method of claim 2, wherein the payload moiety includes at least one semiconductor atom.

4. The method of claim 2, wherein the payload moiety includes at least one metal atom.

5. The method of claim 4, wherein the payload moiety includes at least one iron atom.

6. The method of claim 5, wherein the vector polymer is one of a poly(vinyl ferrocene), a poly (iron III acrylate), and an iron-comprising diblock polymer.

7. The method of claim 1, wherein the film includes the vector polymer and a polymer binder.

8. The method of claim 7, wherein the polymer binder contains ligands attracted to the payload moiety.

9. The method of claim 7, wherein the vector polymer includes polyvinyl ferrocene.

10. The method of claim 9, wherein the polymer binder includes one of poly(dimethylglutarimide) (PMGI), poly(ethylenimine), poly (vinyl pyridine), poly (vinyl alcohol), poly (ethylene/acrylic acid), poly (acrylic acid) and its sodium

salt, poly (maleic acid), poly(dimethylglutarimide), polyamic acid, poly (methyl methacrylate acid), poly (ethylene glycol), poly(propylene glycol), poly(dialkylsiloxane), polysilane, silsesquioxane, and an aluminum-comprising gel.

11. The method of claim 7, wherein the vector polymer is polystyrene-b-iron-complexed poly(vinyl pyridime) and the polymer binder is polystyrene.

12. The method of claim 7, wherein the vector polymer is polymethyl methacrylate-b-poly (iron III acrylate) and the polymer binder is polymethyl methacrylate.

13. The method of claim 7, wherein the forming comprises spin-casting onto the substrate a mixture comprising the vector polymer and the polymer binder in a casting liquid.

14. The method of claim 1, wherein the vector polymer is a diblock polymer A-B, where A includes multiple repeat units each comprising the payload moiety, and B includes multiple repeat units each comprising C, H, N, and O atoms.

15. The method of claim 14, wherein the repeat units of B each further includes at least one of a silicon moiety and an aluminum moiety.

16. The method of claim 1, wherein the film is formed on the substrate with a thickness less than 120 nm.

17. The method of claim 1, wherein patterning the film comprises applying a photoresist over the film, patterning the photoresist, and transferring the photoresist pattern to the film.

18. The method of claim 17, further comprising forming a barrier layer between the photoresist and the film.

19. The method of claim 1, further comprising reflowing the patterned film by heating the patterned film to a temperature above a glass transition temperature of a component of the patterned film.

20. The method of claim 1, wherein removing organic components comprises removing at least one organic moiety of the patterned film.

21. The method of claim 20, wherein at least one organic moiety is removed by oxidation.

22. The method of claim 1, wherein removing organic components comprises converting the payload moiety from a metal species into a salt.

23. The method of claim 1, wherein removing organic components comprises converting the payload moiety into a non-volatile oxide.

24. The method of claim 1, further comprising forming at least one carbon nanotube at the payload-comprising particle.

25. A nanostructure fabrication method, comprising:

forming on a substrate a film including a vector polymer comprising a one or more types of repeat units, at least one of the repeat unit types contains a payload moiety;

patterning the film; and

removing organic components of the patterned film to form respective nanoparticles comprising an average number of payload-moiety-comprising components substantially equal to the number of payload-moiety-comprising repeat units in the vector polymer.

26. Apparatus, comprising:

a set of substantially identical substrates;

at least one reference feature disposed on each substrate; and

at least one nanoparticle disposed on each substrate,

wherein the nanoparticles have an average size of at most 10 nm and are positioned relative to respective reference features on corresponding substrates

within a range of distances distributed with a standard deviation of at most 0.1 µm.

27. The apparatus of claim 26, wherein the nanoparticles have an average size of at most 3 nm.

28. The apparatus of claim 26, further comprising a respective carbon nanotube extending from a nanoparticle of each substrate.